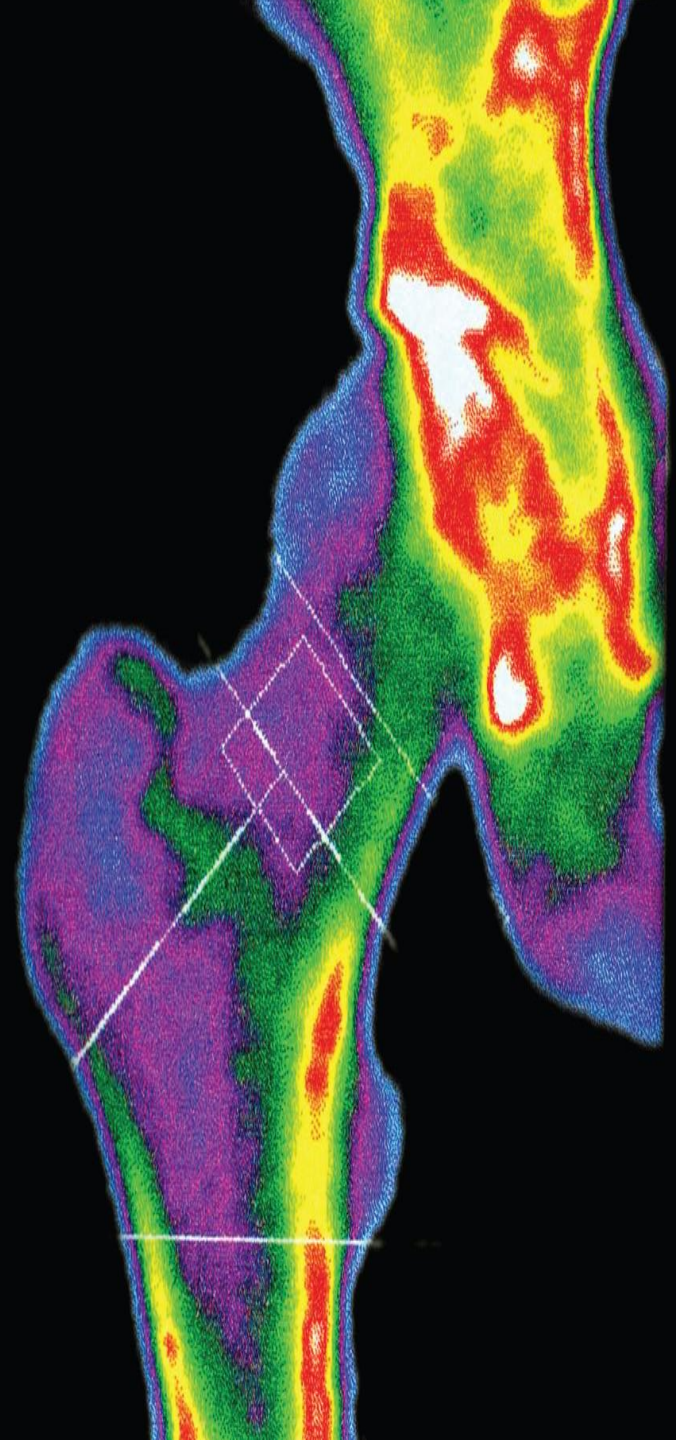
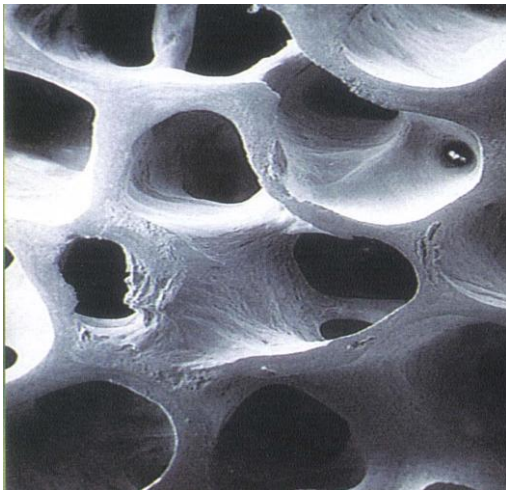




BONE AND GYNECOLOGIST

Dr. Fatih DURMUŞOĞLU



Every 30 seconds someone in the European Union suffers a hip fracture as a result of osteoporosis



A call to action !

It is never too late !



IOF

International Osteoporosis Foundation

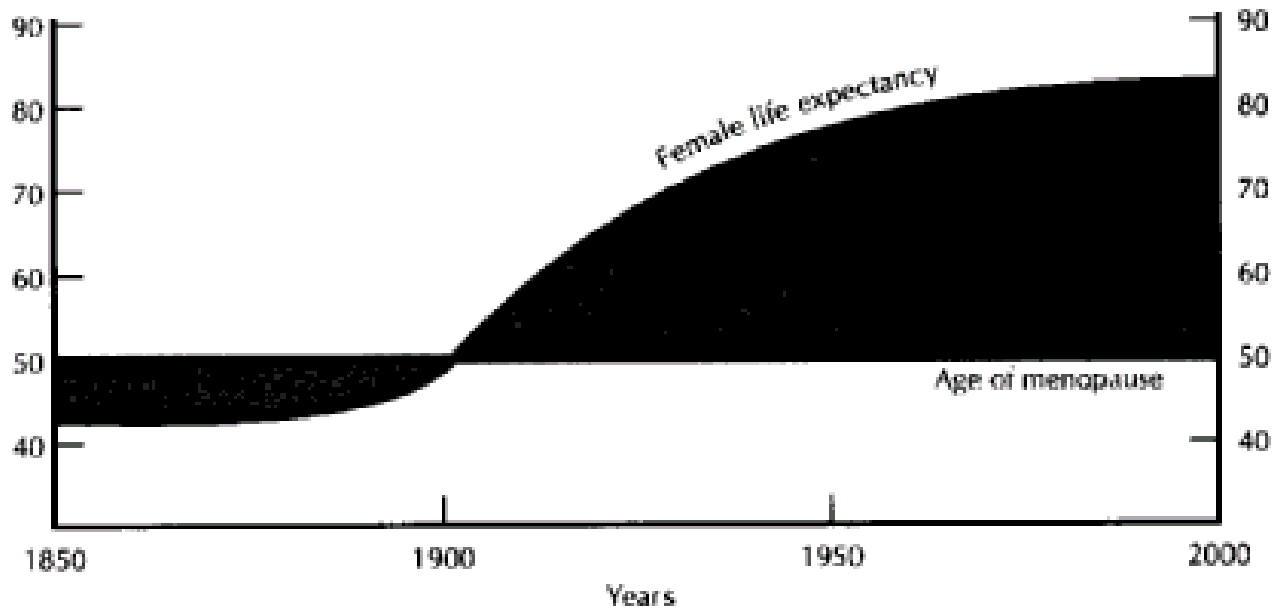
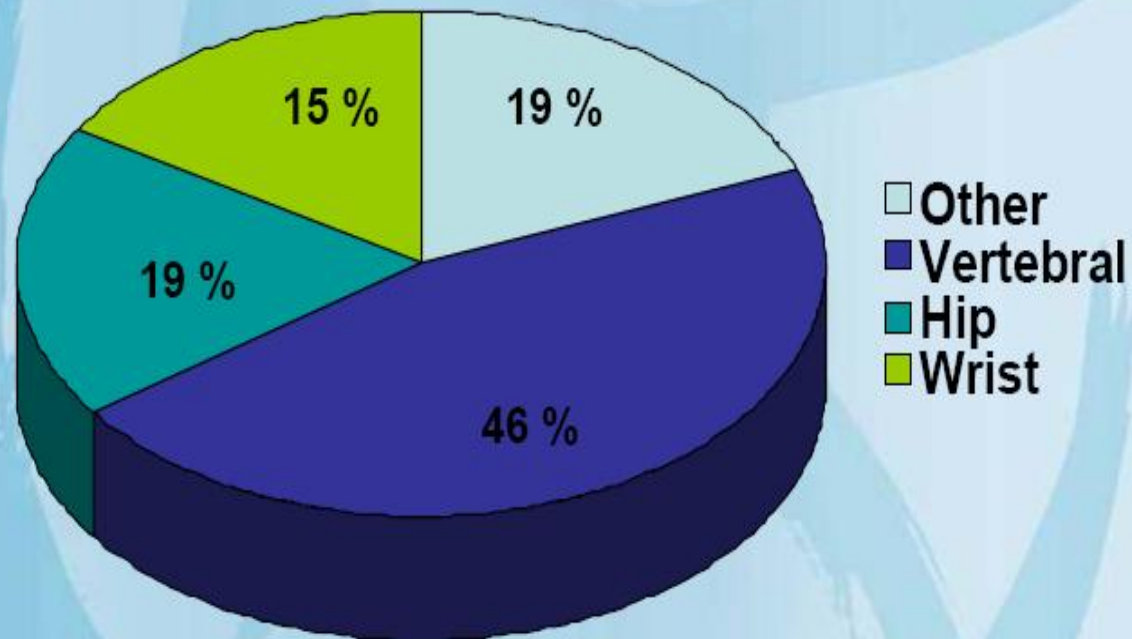


Figure 17.1. Female life expectancy changes in the last 150 years.

Osteoporosis affects the **entire** skeleton

- Osteoporosis is responsible for >1.5 million vertebral and non-vertebral fractures annually
- Spine, hip, and wrist fractures are most common



NIH/ORBD (www.osteoporosis.org), 2000

MEDIAN AGE BY YEARS AND SEX

Median age: total: 29.2 years (Turkey)

male: 28.8 years

female: 29.6 years (2013 est.)

Yıllara ve Cinsiyete Göre Ortanca Yaş, 1935-2013

Median Age by Years and Sex, 1935-2013

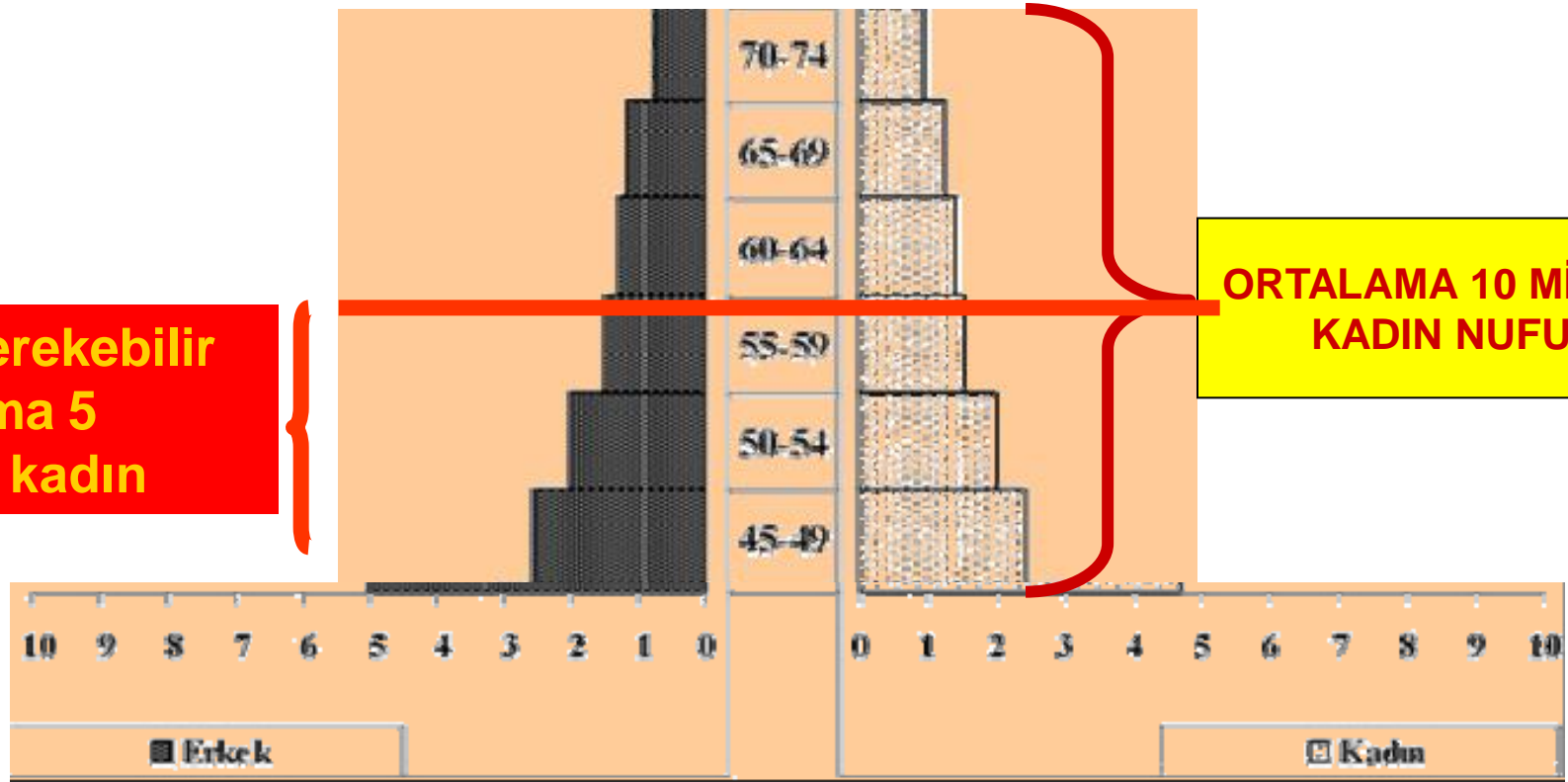
Yıl - Year	Toplam Total	Erkek Male	Kadın Female
Adrese Dayalı Nüfus Kayıt Sistemi - Address Based Population Registration System			
2007	28.3	27.7	28.8
2008	28.5	27.9	29.0
2009	28.8	28.2	29.3
2010	29.2	28.7	29.8
2011	29.7	29.1	30.3
2012	30.1	29.5	30.6
2013	30.4	29.8	31.0

70 mil x %30=21 M
21 mil x %30:6,3 M
6.3mil x %75:4,8 M

Kaynak: Genel Nüfus Sayımı Sonuçları, 1935-2000 ve Adrese Dayalı Nüfus Kayıt Sistemi Sonuçları, 2007-2013

Grafik.3: Türkiye'nin 2000 Yılı Nüfus Sayımına Göre Nüfus Piramidi

Kaynak: DİE (2005), "Türkiye İstatistik Yıllığı, 2004".
Birleşmiş Milletler Nüfus Fonu,
http://www.un.org.tr/unfpa_tur/populationdynamics1_turkey.asp
sayfasından elde edilmiştir.



Risk Factors for Osteoporotic Fracture

With Relative Risk ≥ 2 (Major)

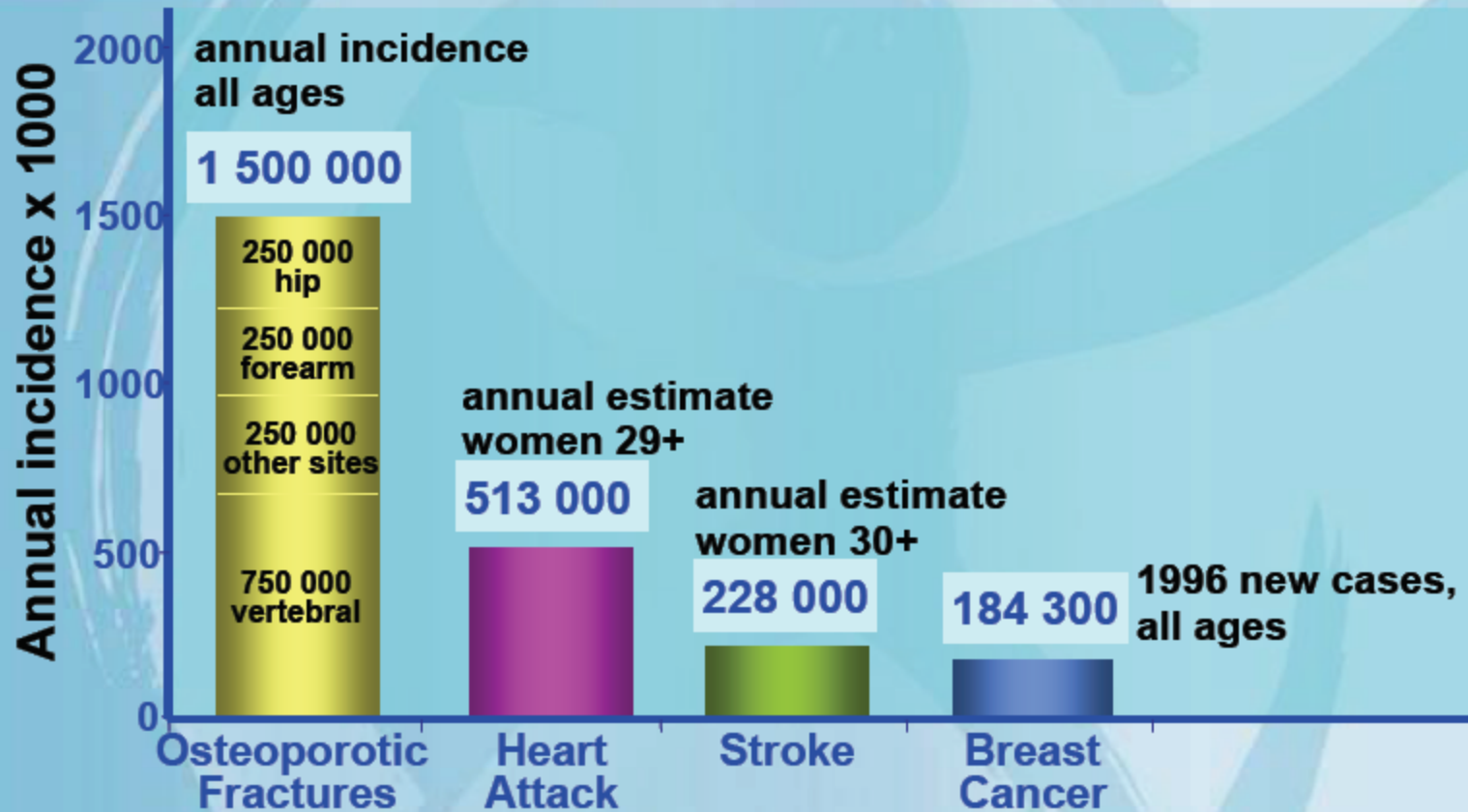
- Age > 70
- Menopause < 45
- Hypogonadism
- Fragility Fracture
- Hip Fracture in Parents
- Glucocorticoids
- Malabsorption
- High Bone Turnover
- Anorexia Nervosa
- BMI < 18
- Immobilisation
- Chronic Renal Failure
- Transplantation

With Relative Risk 1 - 2 (Moderate)

- Estrogen Deficiency
- Calcium Intake < 500 mg/d
- Primary Hyperparathyroidism
- Rheumatoid Arthritis
- Bechterew Disease
- Anticonvulsivants
- Hyperthyroidism
- Diabetes Mellitus
- Smoking
- Alcohol Excess



Osteoporotic fractures: Comparison with other diseases

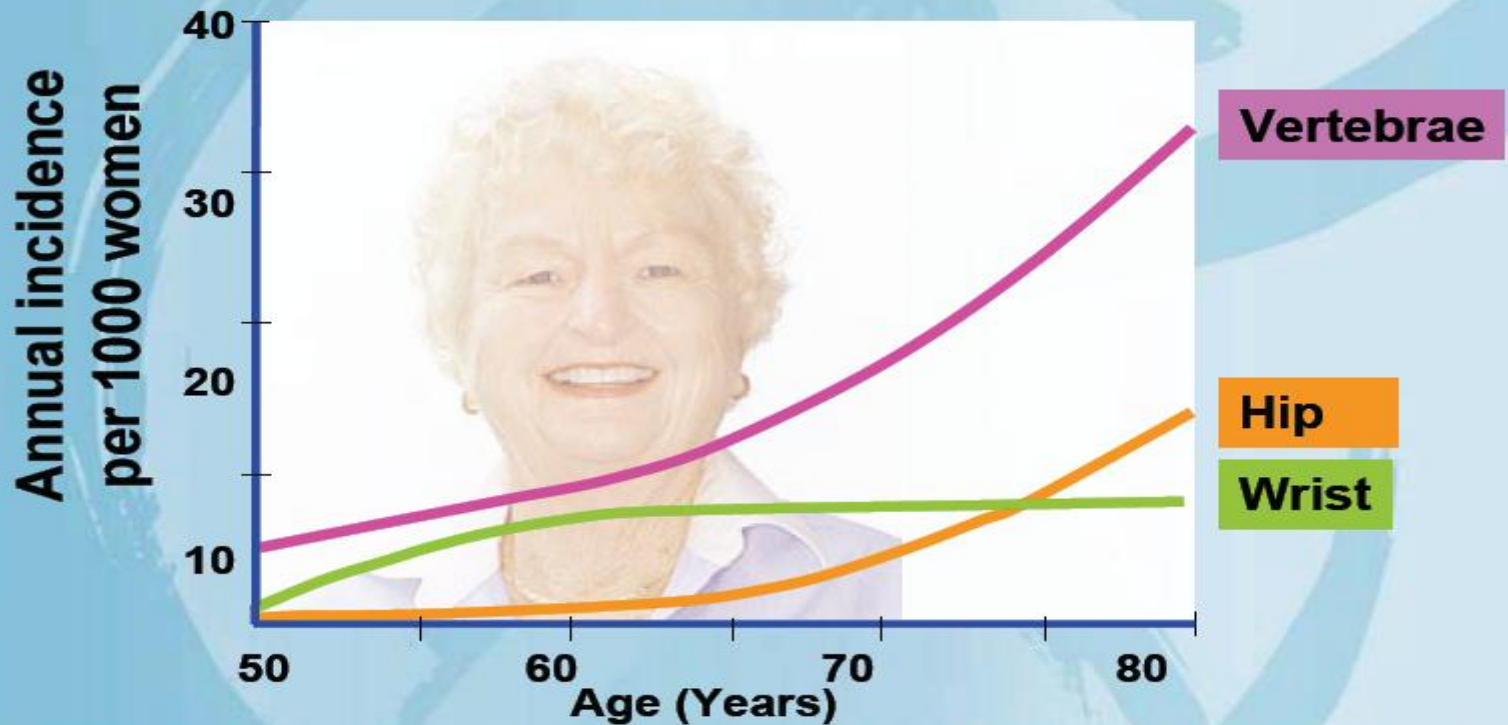


American Heart Association, 1996

American Cancer Society, 1996

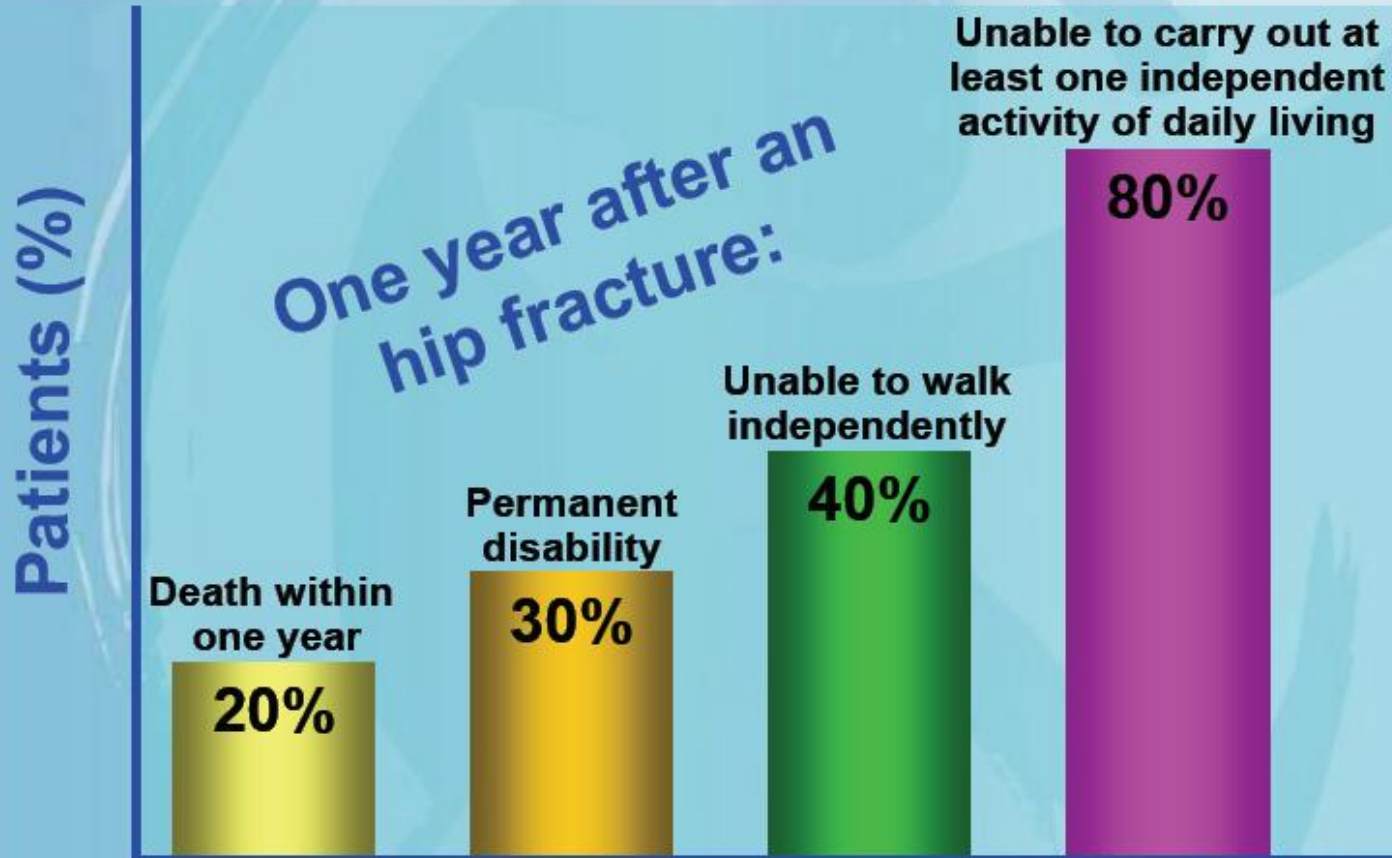
Riggs BL & Melton LJ 3rd, Bone, 1995;17(5 suppl):505S-511S

Incidence of osteoporotic fractures in women



Wasnich RD, Osteoporos Int 1997;7 Suppl 3:68-72

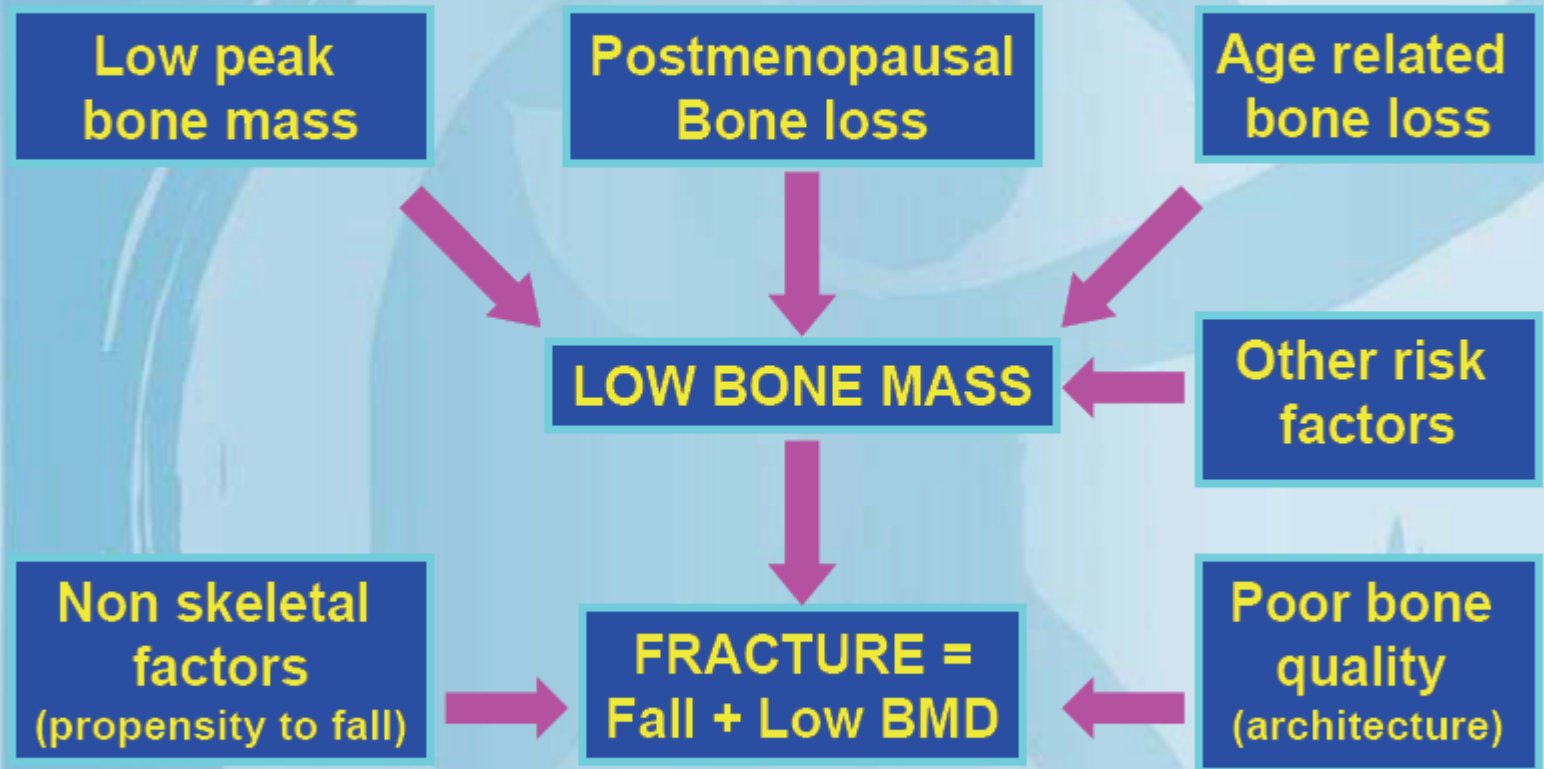
All fractures are associated with morbidity



Cooper C, Am J Med, 1997;103(2A):12S-17S

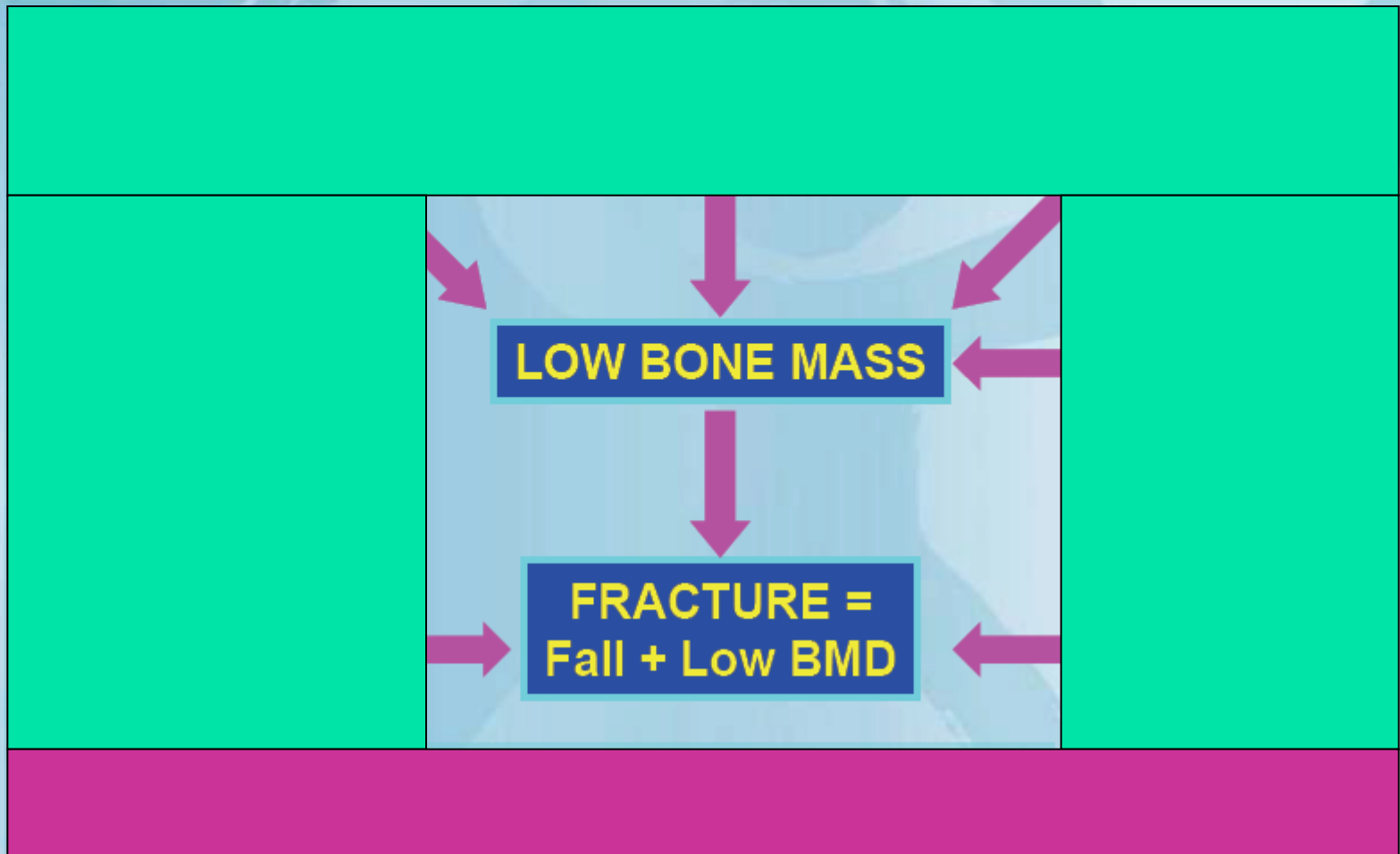
Pathogenesis of osteoporotic fracture

Adapted from Melton LJ & Riggs BL. Osteoporosis: Etiology, Diagnosis and Management
Raven Press, 1988, pp155-179



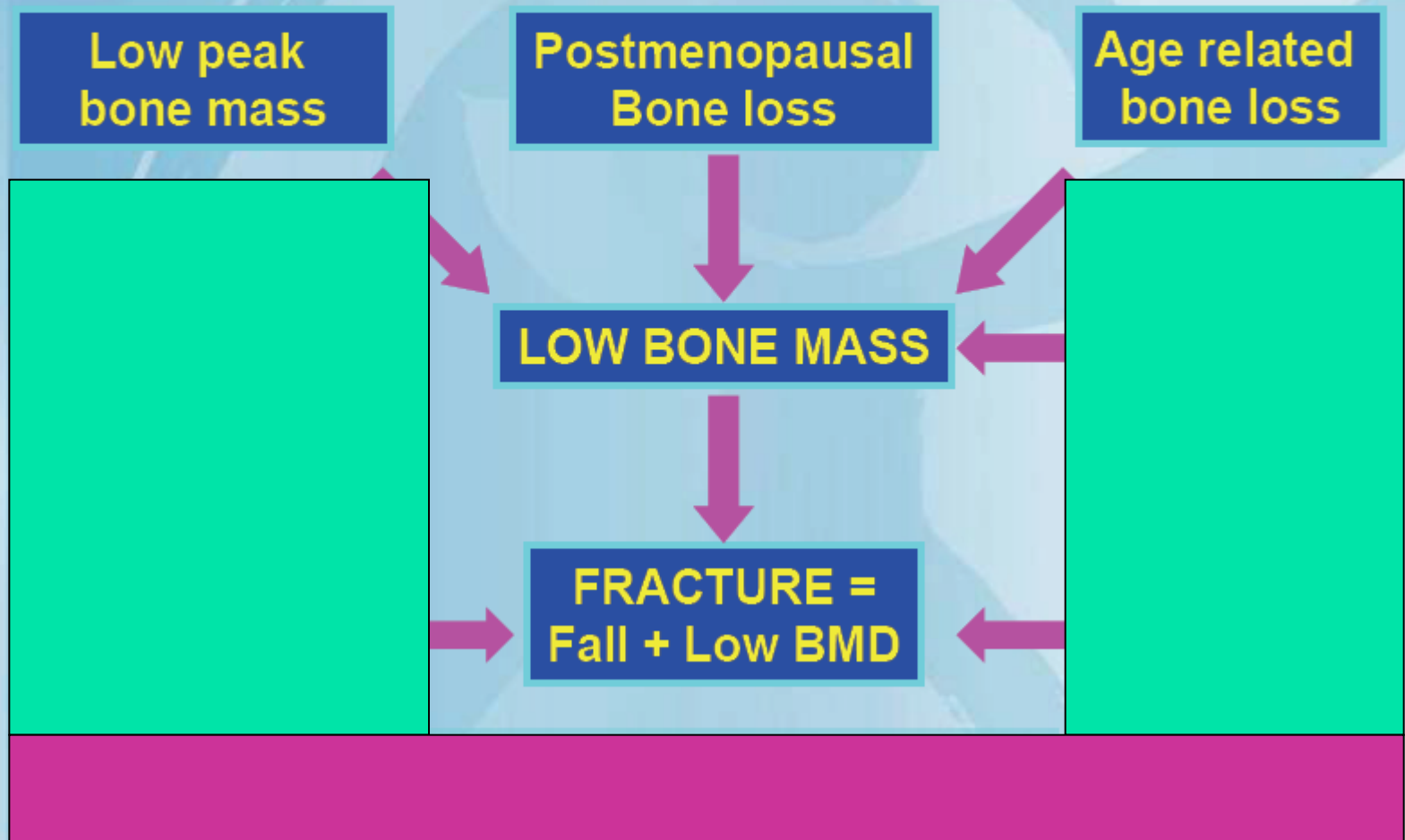
Pathogenesis of osteoporotic fracture

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Raven Press, 1988, pp155-179

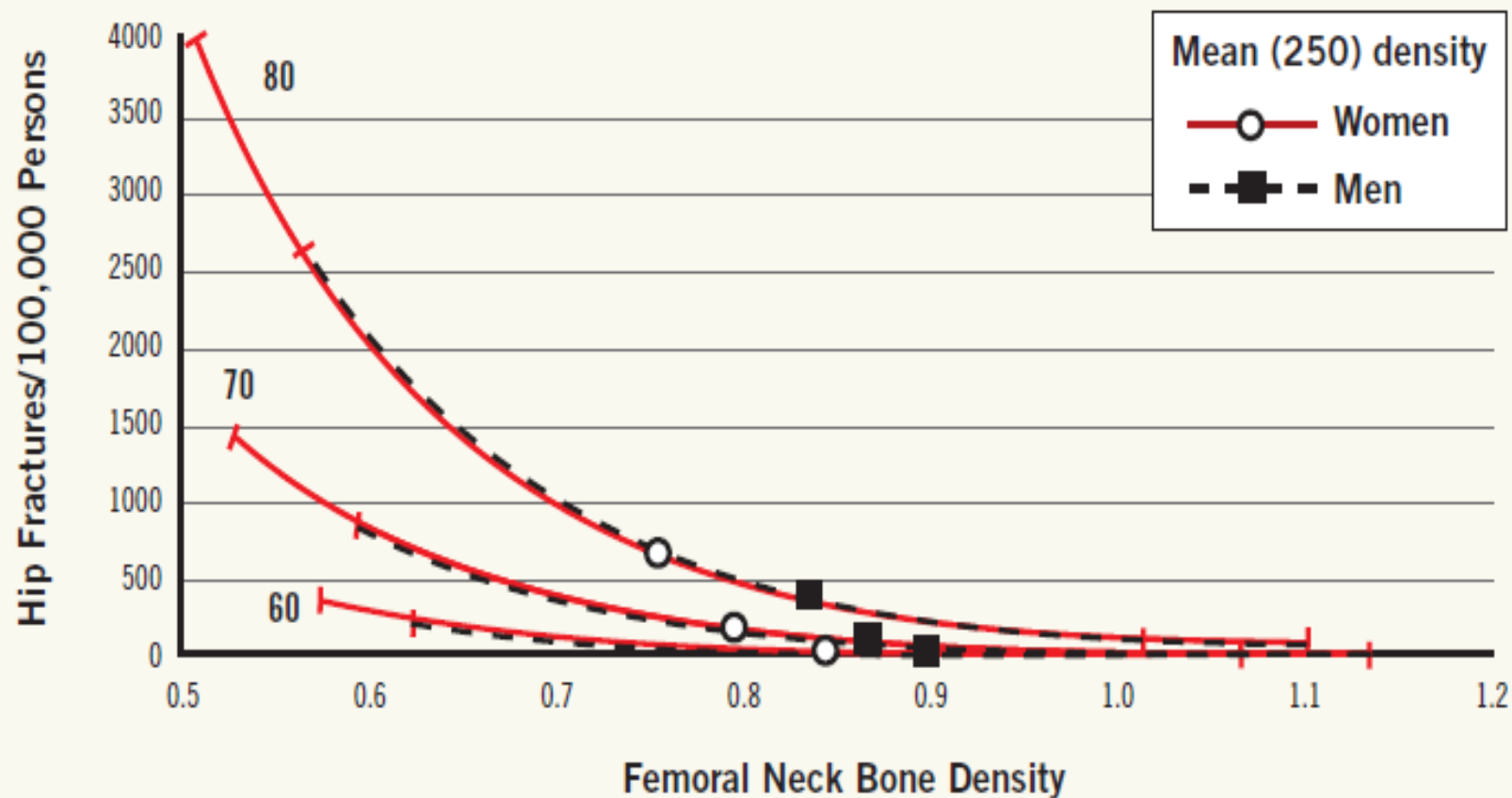


Pathogenesis of osteoporotic fracture

Adapted from Melton LJ & Riggs BL. Osteoporosis: Etiology, Diagnosis and Management
Raven Press, 1988, pp155-179



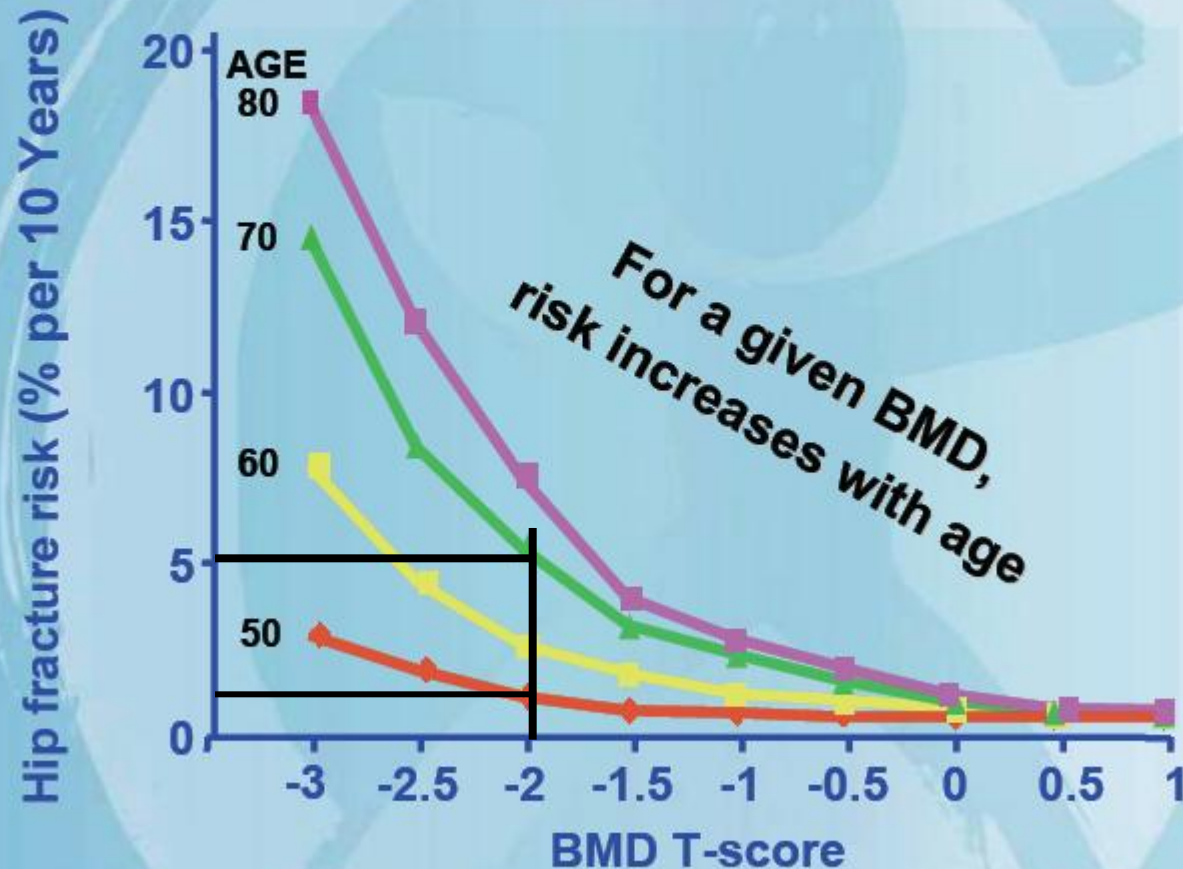
Fracture risk based on age and bone mineral density



One-year cumulative incidence of hip fracture versus femoral neck bone density at ages 60, 70, and 80 years in women and men.

Adapted with permission from de Laet CE, et al. *BMJ*. 1997;315:221-225.

10-Year Fracture Risk: age and BMD



Kanis JA et al, Osteoporos Int, 2001;12:989-995

Ten-year risk of hip fracture for women at the age of 80

Risk factors	Ten-year probability (%)
-	18.0
T-score < -2.5	23.6
Prior fracture	28.8
High turnover	29.5
T-score < -2.5 + prior fracture	36.3
T-score < -2.5 + high turnover	40.1
Prior fracture + high turnover	47.3

Johnell O et al, Osteoporos Int, 2002;13:523-526

Risk factors used in the calculation of 10-year risk of fracture

- Femoral neck T-score
- Age
- Previous low trauma fracture
- Low BMI
- Ever steroid exposure
- Family history of hip fracture
- Current cigarette smoking
- High alcohol intake (> 2 units/day)*

*1 unit = 8 gm alcohol ~ ½ pt. beer ~ glass wine

Kanis JA et al, Bone, 2002;30:251-258
Kanis JA et al, Osteoporos Int, 2005;16:581-589



Risk factors that provide indications for the diagnostic use of bone densitometry

1. Radiographic evidence of osteopenia or vertebral deformity or both
2. Previous fragility fracture
3. Loss of height, thoracic kyphosis
(after radiographic confirmation of vertebral deformities)
4. Presence of strong risk factors:

- Anorexia nervosa
- Malabsorption syndromes
- Primary Hyperparathyroidism
- Post-transplantation
- Chronic renal failure
- Hyperthyroidism
- Prolonged immobilisation
- Cushing's syndrome
- Oestrogen deficiency
- Corticosteroid therapy
- Premature menopause <45 y.
- Maternal family history of hip fracture
- Long-term secondary amenorrhoea >1y.
- Low body mass index (<19 Kg/m²)
- Primary hypogonadism
- Other disorder associated with osteoporosis

Kanis JA, Lancet, 2002;359:1929-1936

Secondary osteoporosis

Endocrine

**Hyperthyroidism
Hypogonadism
Cushing Syndrome**

Nutritional

Drug-induced

**Glucocorticoids
Immunosuppressly
Anticonvulsants**

Immobilization

Others

**Rheumatoid A.
Diabetes
Tumors
(Myeloma, etc.)**

Risk factors for osteoporosis.

Personal history of fracture after age 50
Current low bone mass (T score less than -1.5)
History of fracture in a first degree relative
Being female

Being thin and/or having a small frame/low BMI ($< 21 \text{ kg/m}^2$)

Advanced age

A family history of osteoporosis

Estrogen deficiency as a result of menopause, especially early or surgically induced

Absence of menstrual periods (amenorrhea)

Anorexia nervosa

Low lifetime calcium intake

Vitamin D deficiency

Presence of certain chronic medical conditions (Cushing's syndrome, anorexia, hypogonadism, irritable bowel disease [IBD], diabetes [DM], celiac sprue, hyperparathyroidism, hyperthyroidism, and HIV).

An inactive/sedentary lifestyle

Current cigarette smoking

Excessive use of alcohol

Being Caucasian or Asian, although African Americans and Hispanic Americans are at significant risk as well

In males, testosterone (T) deficiency

Note: Potentially modifiable risks are highlighted in bold (adapted from the NOF).

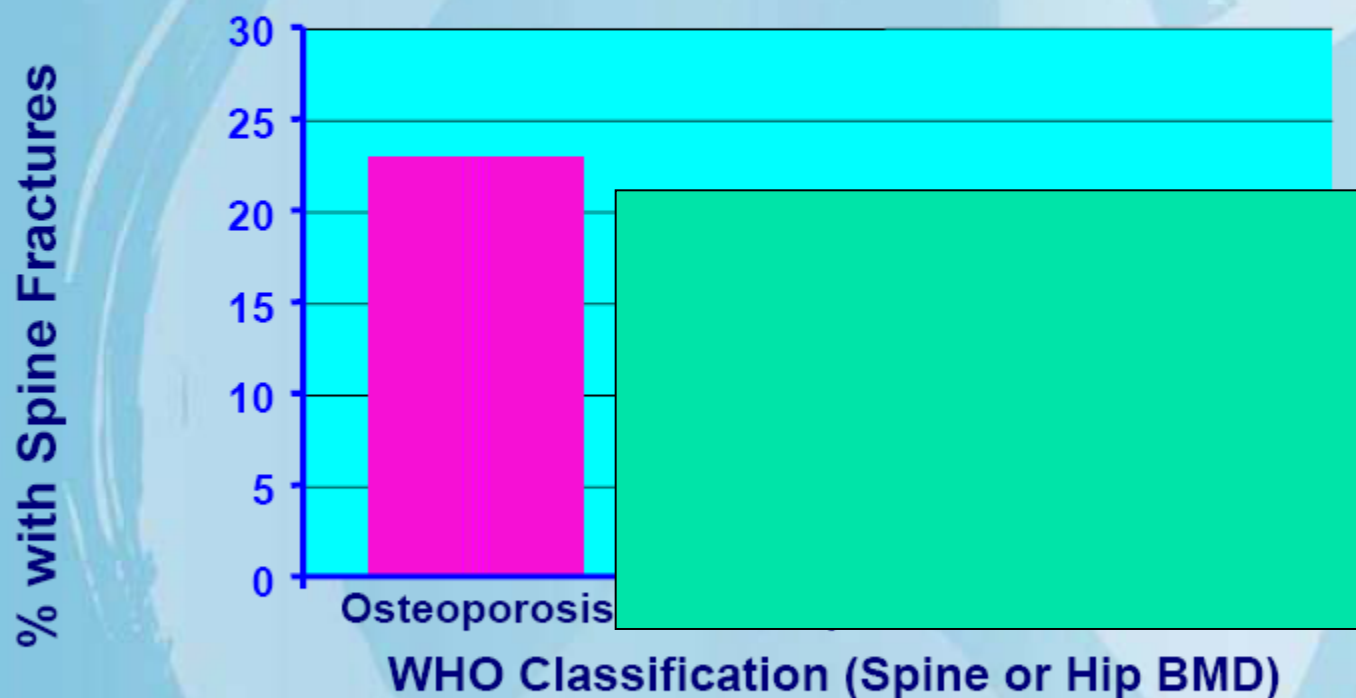


T and Z scores

- ❖ The reference population of the T score is the comparison of BMD to that of healthy 20 to 29 year olds of the same sex.
- ❖ The Z score refers to a reference population of the same sex, race, and age as the patient being tested.
- ❖ The T and Z scores can be applied to both the lumbar spine and hip BMD measurements.
- ❖ The T score is the parameter used by the WHO for diagnoses of osteopenia and osteoporosis.

Classification by T-score alone misses patients with fractures

Classification by BMD alone misses patients with fractures

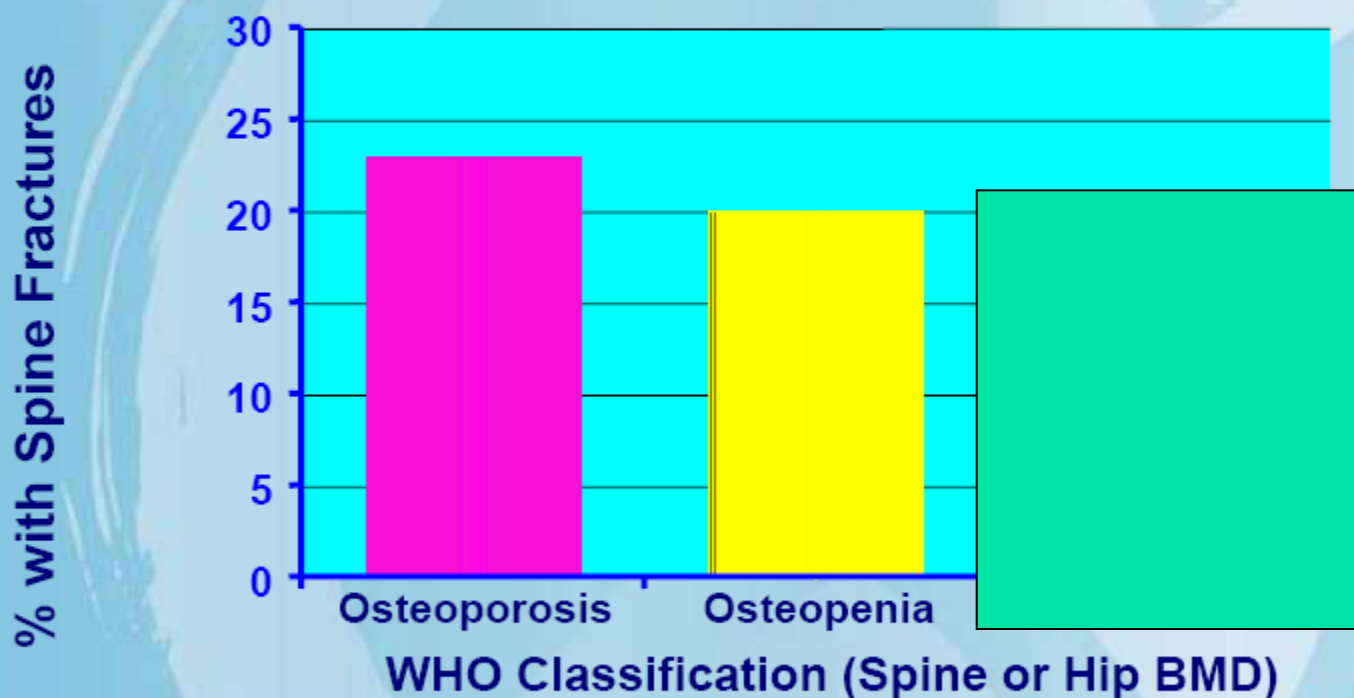


- 50% of women with vertebral fracture are not osteoporotic by BMD
- 1/3 of women needing Rx are missed using BMD alone

Greenspan S et al, J Clin Densitom 2001;4:373-380

Classification by T-score alone misses patients with fractures

Classification by BMD alone misses patients with fractures

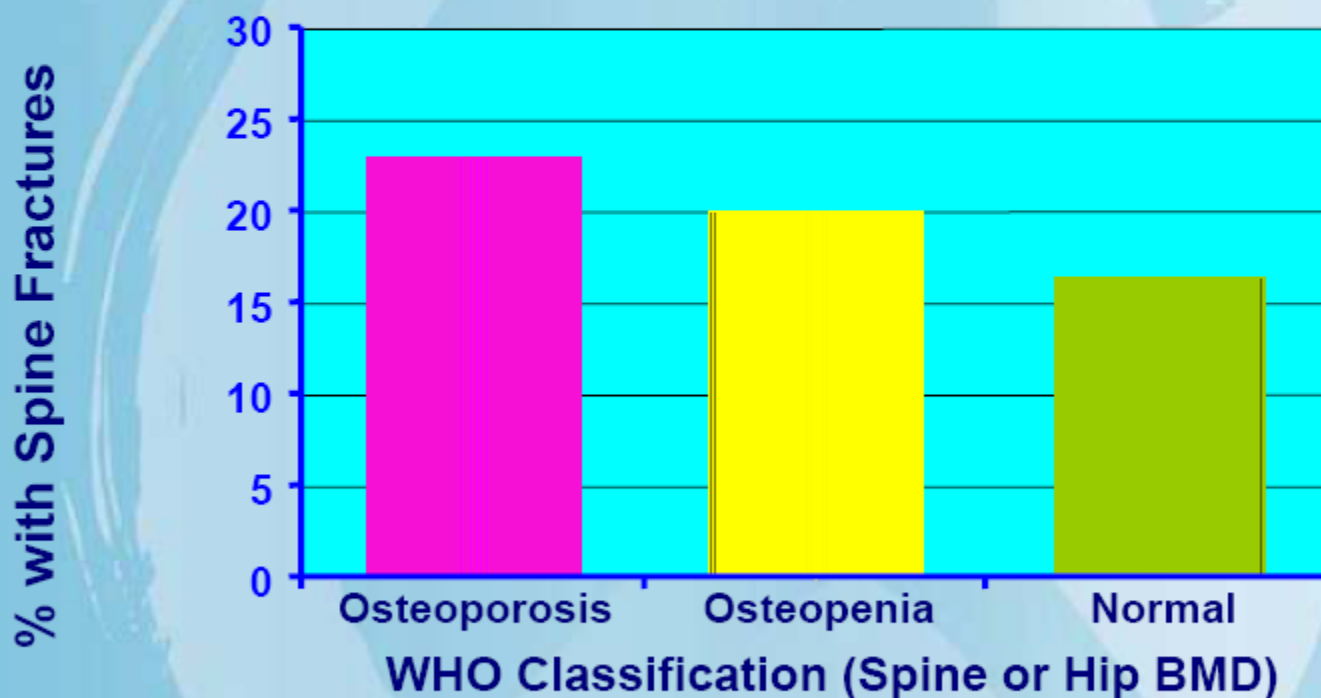


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Classification by T-score alone misses patients with fractures

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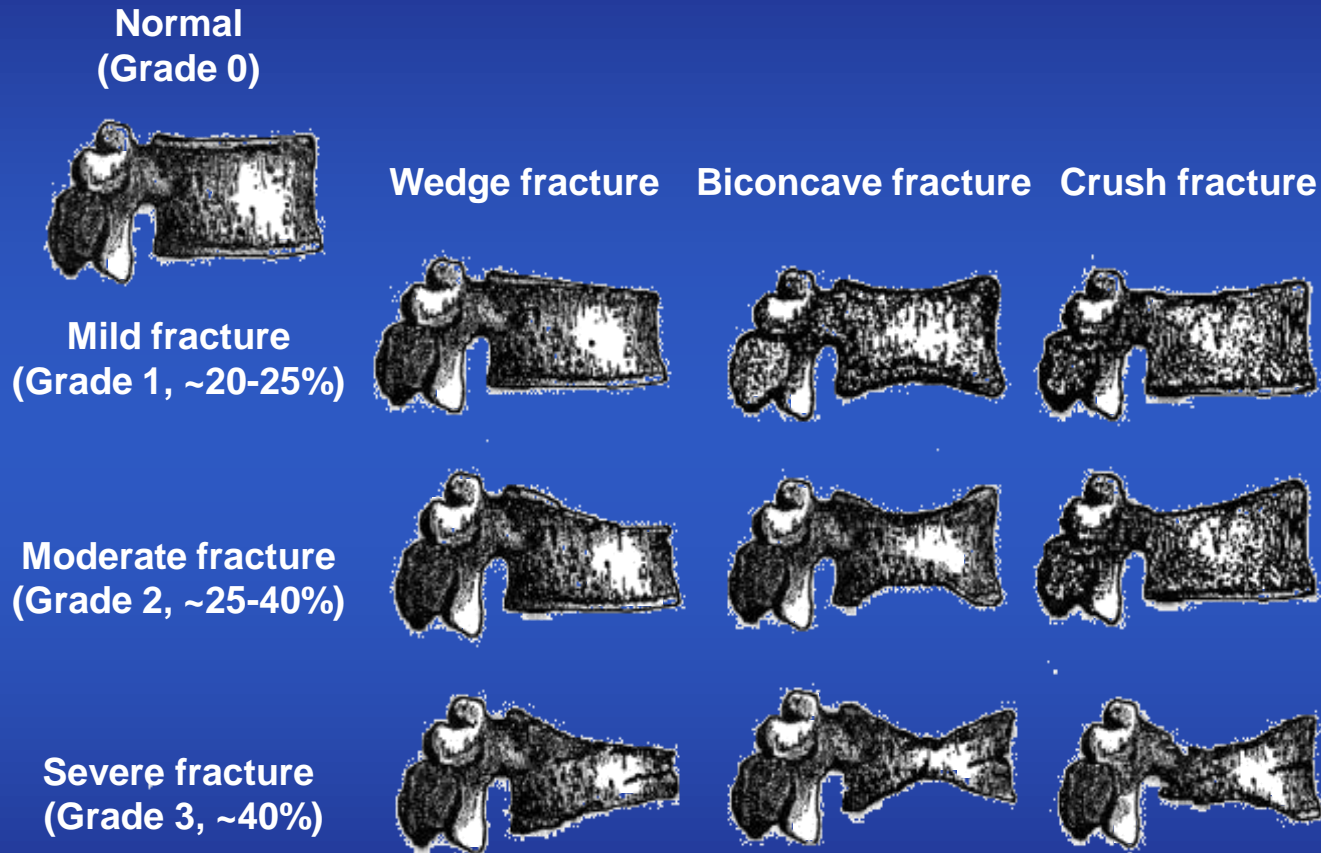
Greenspan S et al, J Clin Densitom 2001;4:373-380



RECOGNITION & REPORTING OF VERTEBRAL FRACTURES

Vertebral Fractures

Semi-quantitative reading / visual scoring

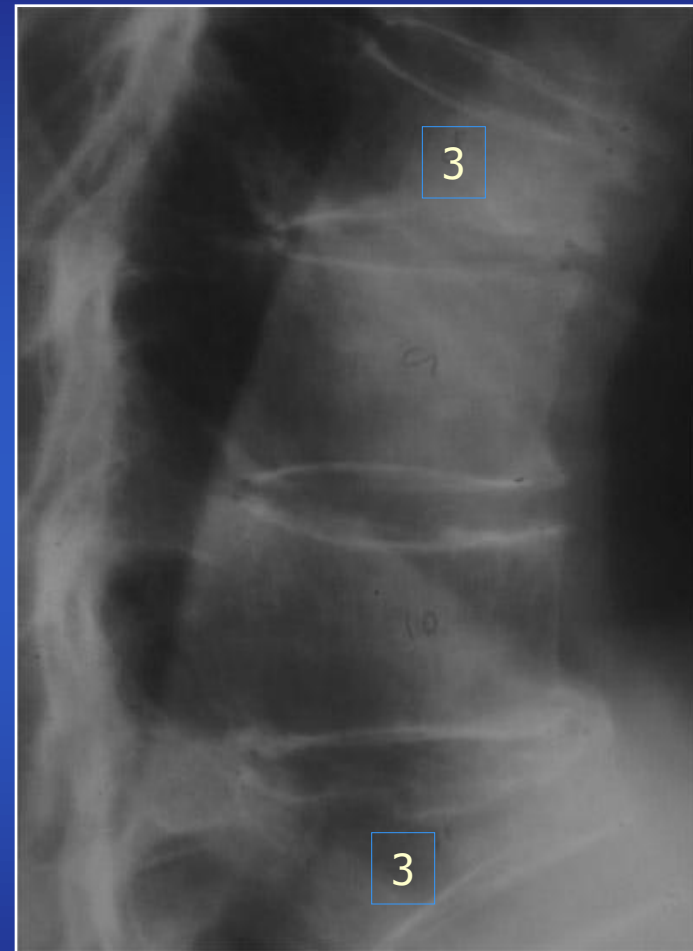


Genant et al., *J Bone Miner Res* 1993, 8:137

SQ Mild FX



SQ Severe FX



Single Energy Fan-beam DXA Imaging a Potential Alternative to Conventional Radiographs

- Single energy imaging
- Fast (10 sec) scanning / breath hold
- Simple visual evaluation
- Low dose (1/100 of radiographs)
- Available at point of care



Importance of Vertebral Fractures

- Most vertebral fractures are a complication of osteoporosis and increase the likelihood of subsequent fractures
- Currently mild and moderate vertebral fractures are often not being recognised and reported, leading to under-diagnosis and under-treatment
- Radiographic diagnosis is considered the best way to identify and confirm the presence of vertebral fractures in clinical practice
- All vertebral fractures identified should be reported as **FRACTURED** to avoid ambiguity caused by other terminology
- Early radiographic diagnosis followed by appropriate therapy will help prevent subsequent fractures
 - Effective therapies are widely available and can reduce vertebral, hip and other fragility fractures by 30% to 65%.

FRAX WHO Fracture Risk Assessment Tool[HOME](#) [CALCULATION TOOL](#) [PAPER CHARTS](#) [FAQ](#) [REFERENCES](#)

Select a Language

Welcome

The FRAX[®] tool has been developed by WHO to evaluate fracture risk of patients. It is based on individual patient models that integrate the risks associated with clinical risk factors as well as bone mineral density (BMD) at the femoral neck.

The FRAX[®] models have been developed from studying population-based cohorts from Europe, North America, Asia and Australia. In their most sophisticated form, the FRAX[®] tool is computer-driven and is available on this site. Several simplified paper versions, based on the number of risk factors are also available, and can be downloaded for office use.

The FRAX[®] algorithms give the 10-year probability of fracture. The output is a 10-year probability of hip fracture and the 10-year probability of a major osteoporotic fracture (clinical spine, forearm, hip or shoulder fracture).



Dr. John A. Kanis
Professor Emeritus, University of Sheffield

Links :

International Osteoporosis Foundation <http://www.iofbonehealth.org/>
National Osteoporosis Foundation <http://www.nof.org/>
Japan Osteoporosis Foundation <http://www.jofof.or.jp/>
European Society for Clinical and Economic aspects of Osteoporosis and Osteoarthritis <http://www.esceo.org/>

[Latest release notes](#)

FRAX[®] WHO Fracture Risk Assessment Tool

HOME CALCULATION TOOL PAPER CHARTS FAQ REFERENCES

Select Language

Calculation Tool

Please answer the questions below to calculate the ten year probability of fracture with BMD.

Country: Turkey Name / ID: About the risk factors ⓘ

Questionnaire:

1. Age (between 40-90 years) at Date of birth
Age: Date of birth: Y: M: D:

2. Sex Male Female

3. Weight (kg)

4. Height (cm)

5. Previous fracture No Yes

6. Parent/child hip No Yes

7. Current smoking No Yes

8. Glucocorticoids No Yes

9. Rheumatoid arthritis No Yes

10. Secondary osteoporosis No Yes

11. Alcohol 3 or more units per day No Yes

12. Femoral neck BMD (g/cm²)
Select DDXA

Risk Faktörleri;

- 1.Yaş
- 2.Cinsiyet
- 3-Ağırlık
- 4-Boy
- 5-Geçirilmiş kırık
- 6-aile öyküsünde kırık
- 7-sigara
- 8-Glukokortikoidler
- 9-Romatoit artirit
- 10-Sekonder osteoporoz
- 11-Alkol 3 birimden fazla
- 12-Kemik mineral yoğunluğu

WHO – FRAX

(www.shef.ac.uk/FRAX)

- İnternet tabanlı WHO denetimi ve onayını almış puanlama sistemi
- KMY dahil 12 risk faktörünü içeriğinde bulunduruyor.
- Amacı 10 yıl içerisinde kalça kırığı olasılığını hesaplayan bir sistem
- Kadın ve erkek popülasyonu için kullanılıyor
- 10 yıl içerisinde kalça için 3%
- Diğer major osteoporotik bölgelerde %20 üzerinde kümülatif risk faktörü olması halinde farmakolojik tedavi başlanması endike görülmektedir.
- Frax kullanılarak yapılan tedavi protokollerinin total riskte %35 azalmaya ve daha ekonomik bir tedavi seçeneği sağladığı görülmektedir.

THE WHO FRACTURE RISK ASSESSMENT TOOL

Country : Name / ID : JN [About the risk factors](#) 

Questionnaire:

1. Age (between 40-90 years) or Date of birth
 Age: Date of birth: Y: M: D:

2. Sex Male Female

3. Weight (kg)

4. Height (cm)

5. Previous fracture No Yes

6. Parent fractured hip No Yes

7. Current smoking No Yes

8. Glucocorticoids No Yes

9. Rheumatoid arthritis No Yes

10. Secondary osteoporosis No Yes

11. Alcohol 3 or more units per day No Yes

12. Femoral neck BMD (g/cm²)
 T-Score

BMI 21.6 

The ten year probability of fracture (%)

with BMD

Major osteoporotic	8.5
Hip fracture	1.4

FRAX[®] is available online at <http://www.shef.ac.uk/FRAX/>. Clinicians can select among countries in Europe,

North and South America, and Asia. Within the United States, 4 race/ethnic categories are available. The calculator incorporates information about sex, weight, height, and risk factors for osteoporosis, such as personal and family history of fracture, current smoking, glucocorticoids, rheumatoid arthritis, secondary osteoporosis, and alcohol use. Depending on the country selected, a bone density measurement or T-score can be factored into the risk calculation. These results are given as a 10-year risk of hip fractures and major fractures.

By systematically assessing risk factors, FRAX serves as a useful tool in treatment decisions for patients in the intermediate range of bone density. This targets treatment to those most at risk of fracture and illustrates how changes in risk factors age and family

WHO – osteoporozis tarama kriterleri (KMY)



- Age >65 without additional risk factor.
- Age <65 more than 1 or 2 Osteoporosis risk factors.
- WHO and FRAX screening is not applicable for premenopausal ,men under 50 yrs and children.
- Z scor is suitable for the group out of forementioned criteria



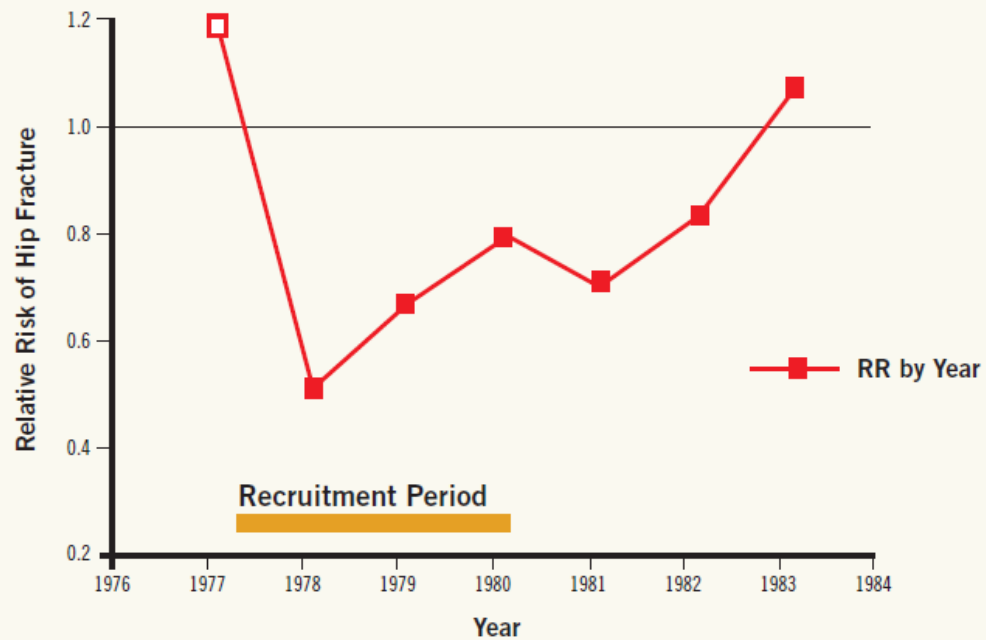
TABLE**Effect of hormone therapy on fracture risk by age at start of therapy**

Type of Fracture	Age at Start of HT	Relative Risk
Hip and wrist	<60 y	0.45 (0.3, 0.8)
Hip and wrist	>60 y	0.88 (0.5, 1.6)

Meta-analysis based on 14 trials.

Torgerson DJ, Bell-Syer SE. *JAMA*. 2001;285:2891-2897.

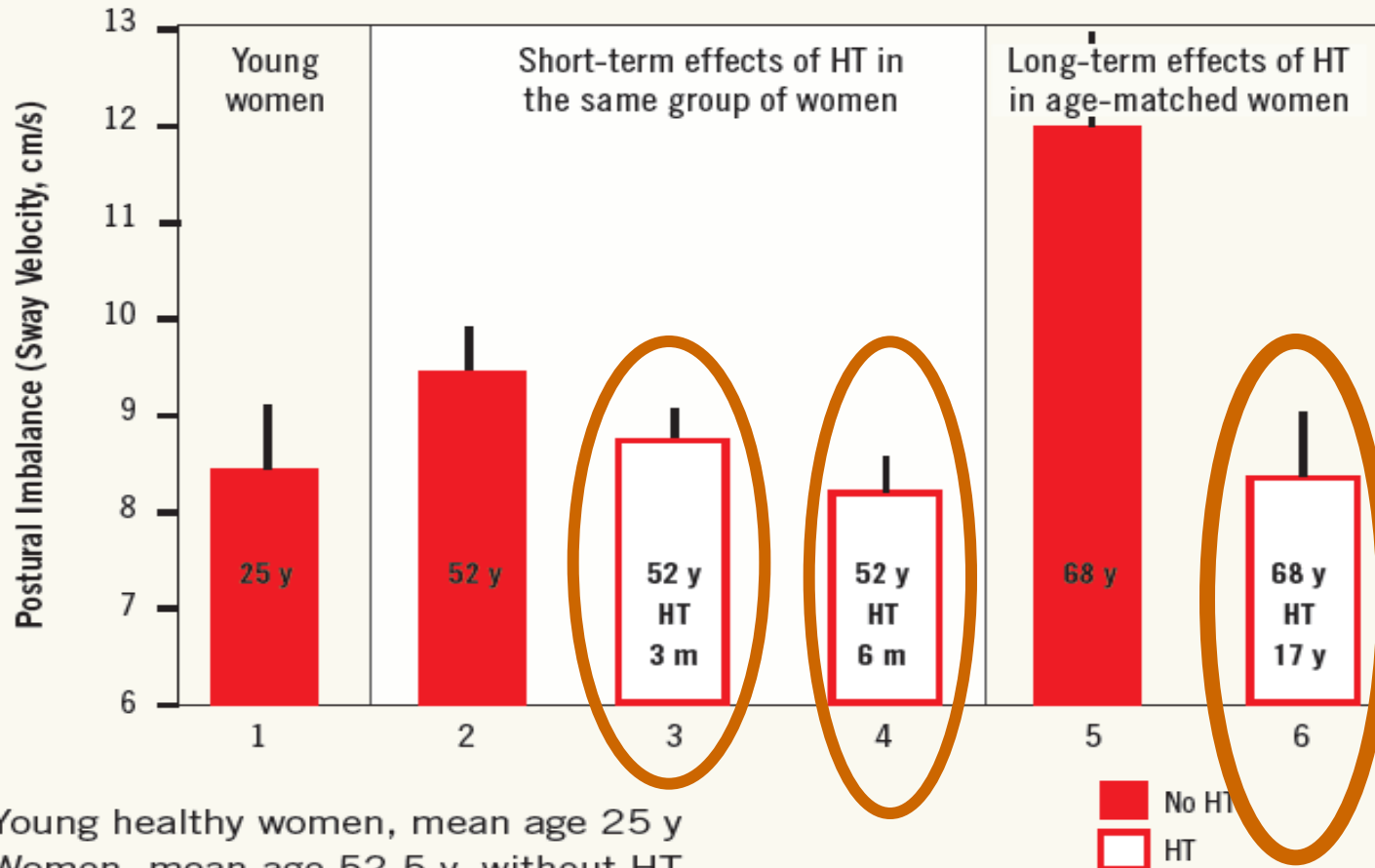
Hip fractures during and after hormone therapy



Relative risk of hip fracture in 23,000 women during and after a period of receiving prescriptions for hormone therapy (HT). Questionnaires filled out by participants indicated that only 20% were still using HT at the end of follow-up (1983).

Adapted with permission from Naessen T, et al. *Ann Intern Med.* 1990;113:95-103.

Postural balance after short-term and long-term HT



1. Young healthy women, mean age 25 y
2. Women, mean age 52.5 y, without HT
3. Same women as column 2 after 3 months of HT
4. Same women as column 2 after 6 months of HT
5. Women without HT, mean age 68 y, age-matched to women in column 6
6. Women with HT since menopause, mean duration 17 y

HT, hormone therapy.

Postural balance in women at various mean ages and the short-term and long-term effects of HT initiated soon after menopause.

Adapted from Naessen T, et al. *Menopause*. 2007;14:14-19.

TABLE 3

Estimated risks from randomized controlled trials for important cardiovascular, cancer, and osteoporosis events associated with unopposed estrogen and combined estrogen and progestin.

Outcome	Estrogen-progestin				Unopposed	
	WHI		HERS		WHI	
	RH	95% CI	RH	95% CI	RH	95% CI
Hip fracture	0.6	0.33–1.33	1.09	0.48–2.46	0.61	0.33–1.11

CHD: coronary heart disease; CI: confidence interval; HERS: Heart and Estrogen/progestin Replacement Study (24); RH: adjusted relative hazards; VTE: venous thromboembolism; WHI: Women's Health Initiative (26, 27, 48, 49, 87).

ASRM Practice Committee. HT in Postmenopausal Women. Fertil Steril 2008.

Estrojen ve progesterone veya karşılanmamış estrojen kalça kırığı etkileri

TABLE 4

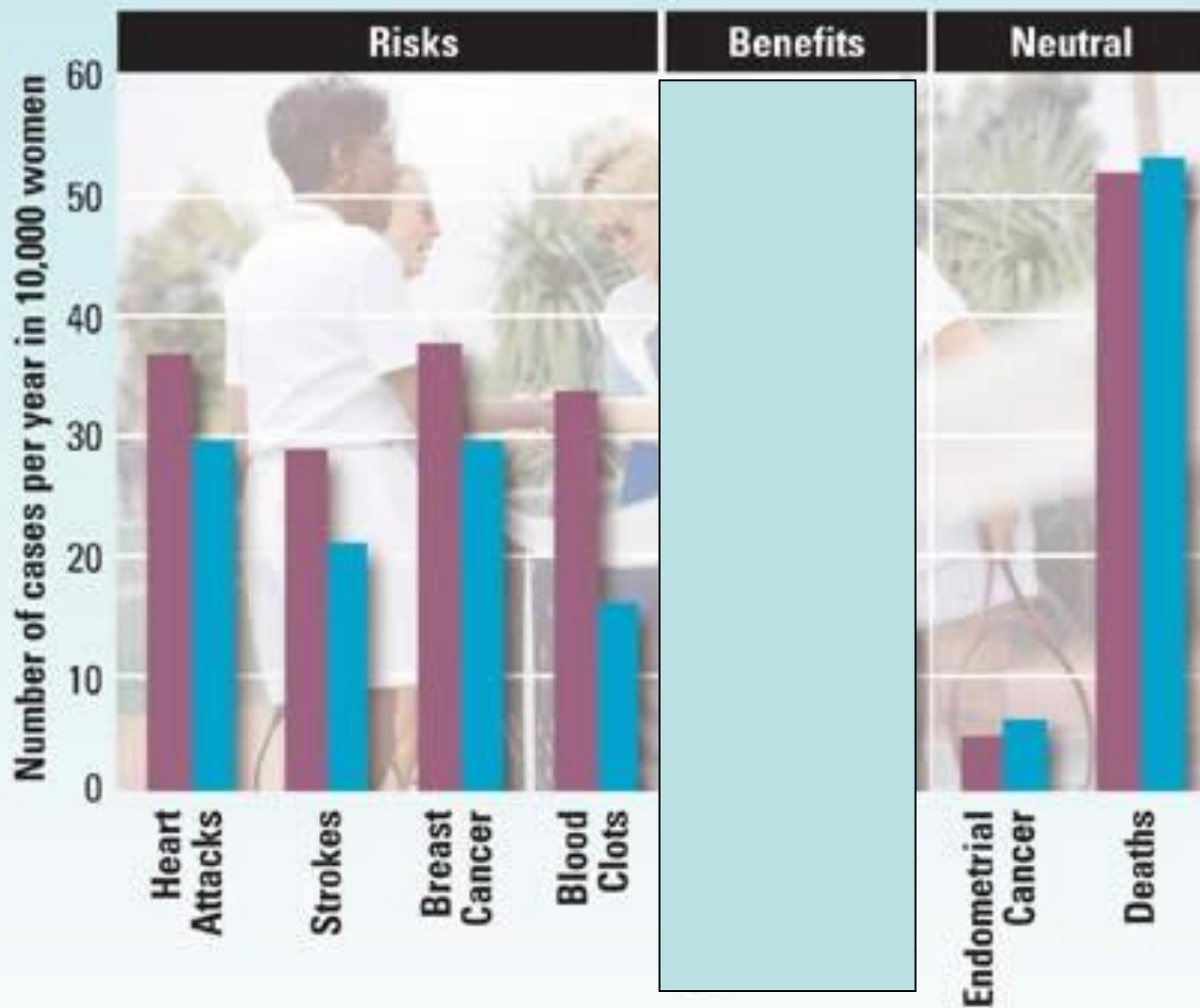
Randomized controlled trials and hip fracture with estrogen and progestin or unopposed estrogen.

Study	Exposure	Relative rate	95% CI
Hulley et al., 2002 (24)	Estrogen–progestin	1.09	0.48–2.46
Komulainen et al., 1998 (25)	All hormones	0.43	0.20–0.91
WHI 2002 (26)	Estrogen–progestin	0.66	0.33–1.33
WHI 2004 (27)	Estrogen	0.61	0.33–1.11
Summary		0.64	0.45–0.92

ASRM Practice Committee. HT in Postmenopausal Women. Fertil Steril 2008.

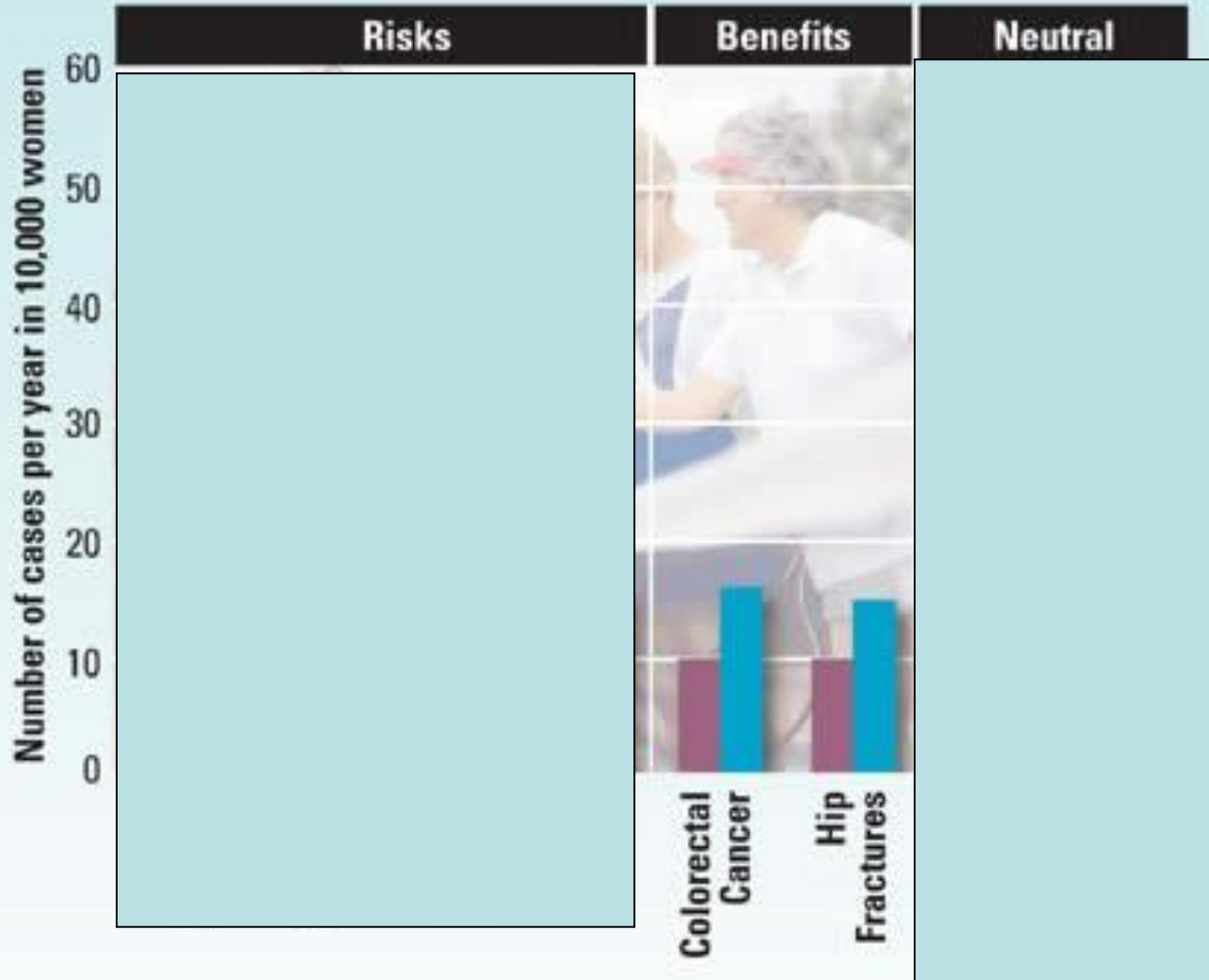
Disease rates for women as shown by WHI study results

■ Estrogen + progestin ■ Placebo



Disease rates for women as shown by WHI study results

■ Estrogen + progestin ■ Placebo



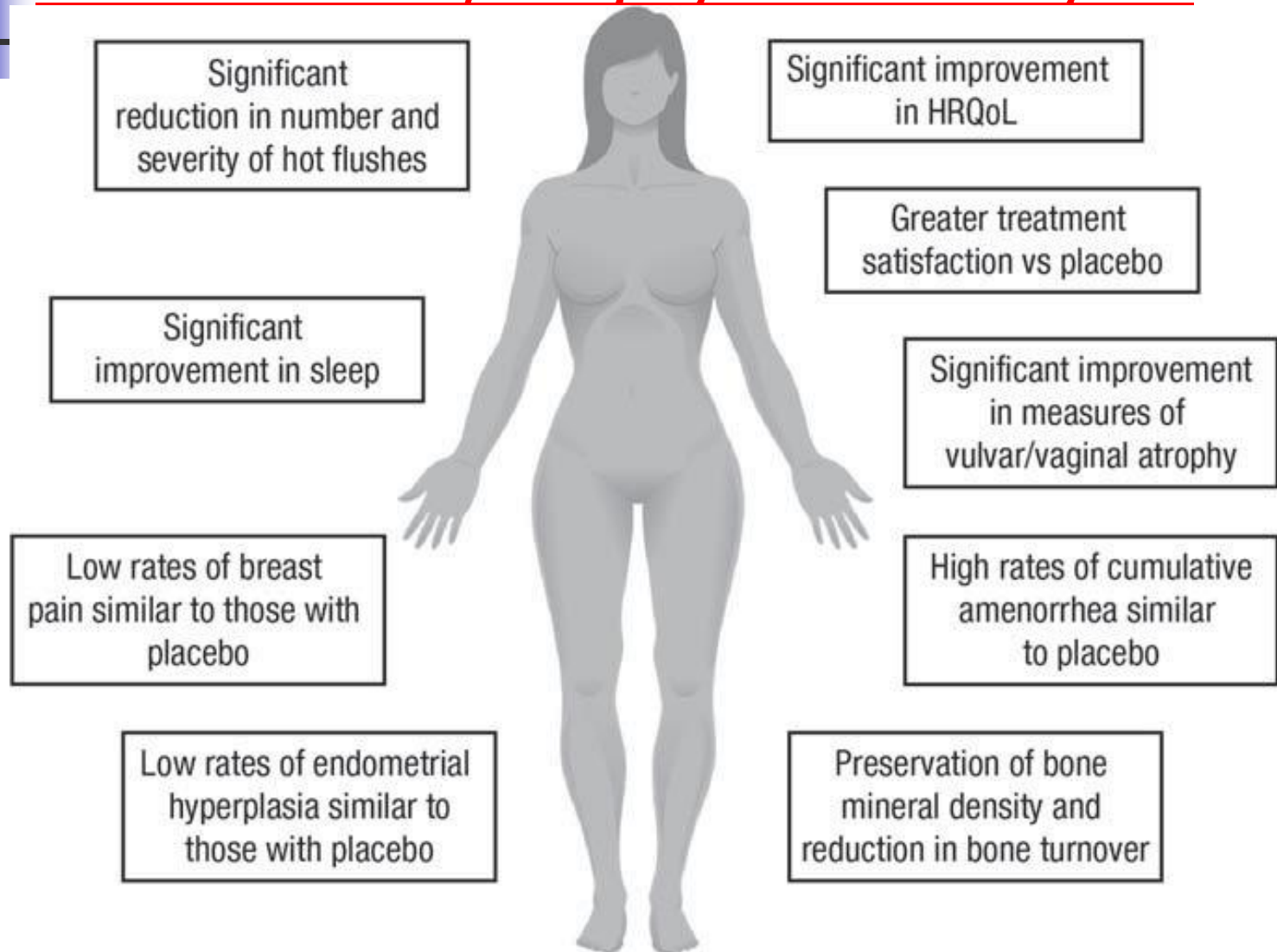


HRT

- E/PT causes remarkable decrease at major sites of skeleton
- E alone decreases 50-60% arm and hip fractures.
- E+Ca leads to decrease in vertebral fracture 80%. (E at least for 5 years)
- Low doses of E and EPT is efficient in the prevention of osteoporosis as well as other symptoms of Menopause.

THE NORTH AMERICAN MENOPAUSE SOCIETY

Summary of benefits for bazedoxifene/conjugated estrogens



Treatment Criteria by Osteoporotic fractures

Table 1. Treatment Criteria by Osteoporotic Fractures Predictive Model

Fracture Risk Assessment Tool ⁴	North American Menopause Society Treatment Guideline 2010 ⁶	North American Menopause Society Treatment Guideline 2006 ¹⁹
All postmenopausal women aged 50 y or older who have: Low bone mass (T-score between -1.0 and -2.5 at the femoral neck or spine) and a 10-y probability of a hip fracture 3% or greater or a 10-y probability of a major osteoporosis-related fracture 20% or greater based on the U.S.-adapted Worth Health Organization algorithm*	All postmenopausal women who have: An osteoporotic vertebral or hip fracture BMD values consistent with osteoporosis (ie, T-scores -2.5 or less) at the lumbar spine, femoral neck, or total hip region T-scores from -1.0 to -2.5 and a 10-y risk based on the Fracture Risk Assessment Tool calculator, of major osteoporotic fracture (spine, hip, shoulder, and wrist) of 20% or greater or of hip fracture of 3% or greater	All postmenopausal women who have: An osteoporotic vertebral fracture BMD values consistent with osteoporosis (ie, T-scores equal to or worse than -2.5) T-scores from -2.0 to -2.5 and at least one of the following risk factors for fracture: thinness (body weight less than 127 pounds [57.7 kg] or low BMI [less than 21 kg/m ²]), history of fragility fracture since menopause, or history of hip fracture in a parent

BMD, bone mineral density; BMI, body mass index.

* Clinician's judgment, patient preferences, or both may indicate treatment for people with 10-y fracture probabilities above or below these



WHEN THE GYN STOP & EVALUATE



- Any primary fracture caused by osteoporosis
- Secondary osteoporozis
- T score below -2,5 and Z score below 2
- High rate progression of Osteoporosis on HRT

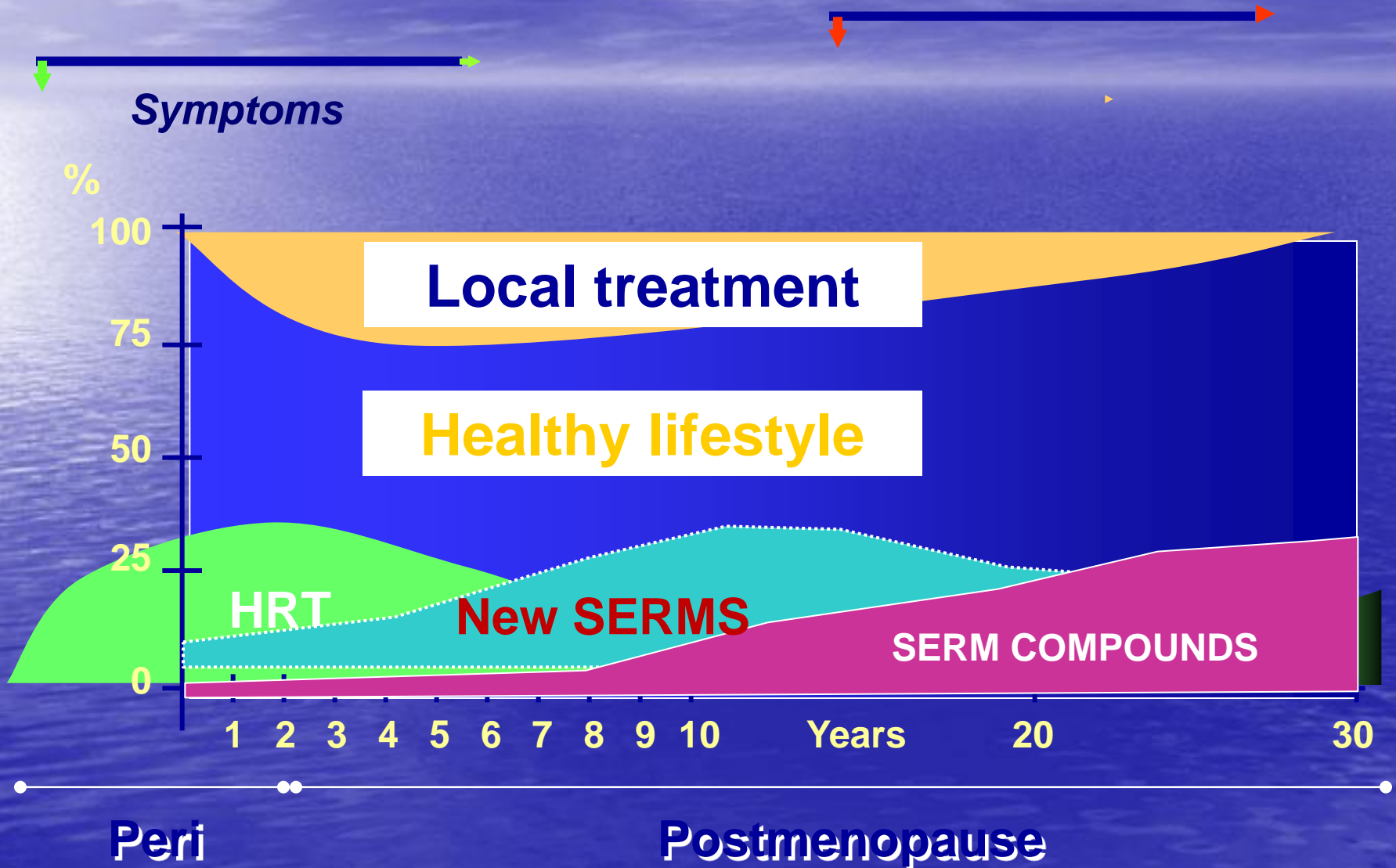
WHEN THE GYN STOP & EVALUATE

With Relative Risk ≥ 2 *(Major)*

- **Age > 70**
- **Menopause < 45**
- **Hypogonadism**
- **Fragility Fracture**
- **Hip Fracture in Parents**
- **Glucocorticoids**
- **Malabsorption**
- **High Bone Turnover**
- **Anorexia Nervosa**
- **BMI < 18**
- **Immobilisation**
- **Chronic Renal Failure**
- **Transplantation**

Dynamic decision making chart

Established Osteoporosis & Fractures



GYNECOLOGIST

NON-GYNECOLOGICAL
TREATMENT
&
FOLLOW UP

SECONDARY OSTEOPOROSIS

- Differential Diagnosis
- Referral to Specialist

LIFE STYLE CHANGES
NUTRITION & PROPER PHYSICAL
EXERCISE
PREVENTION OF FALLS
EARLY START OF HRT
1. PREMATURE MENOPAUSE &
2. SYMPTOMATIC MENOPAUSAL WOMEN



THANK YOU FOR YOUR ATTENTION
Fatih Durmuşođlu